Cisco 4x InfiniBand Switch Module for IBM BladeCenter User Guide

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Preface

Audience

The intended audience is the administrator responsible for installing, configuring, and managing Server Switch equipment. This administrator should have experience administering similar networking or storage equipment.

Organization

This publication is organized as follows:

Chapter	Title	Description
Chapter 1	About the Server Switch Module	Describes the server switch module and HCA expansion cards, including topology, management, the LEDs, and external InfiniBand ports.
Chapter 2	Installing and Configuring the Server Switch	Installation, configuration, and external connection of the server switch module are described.
Chapter 3	Specifications	Electrical and environmental requirements are described in this chapter.

Conventions

This document uses the following conventions:

Convention	Description
boldface font	Commands, command options, and keywords are in **boldface**. Bold text indicates Chassis Manager elements or text that you must enter as-is.
italic font	Arguments in commands for which you supply values are in *italics*. Italics not used in commands indicate emphasis.

Convention	Description
Menu1 > Menu2 > Item…	Series indicate a pop-up menu sequence to open a form or execute a desired function.
[ ]	Elements in square brackets are optional.
{ x | y | z }	Alternative keywords are grouped in braces and separated by vertical bars. Braces can also be used to group keywords and/or arguments; for example, {**interface** *interface* **type**}.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
`screen` font	Terminal sessions and information the system displays are in `screen` font.
`boldface screen` font	Information you must enter is in **`boldface screen`** font.
italic screen font	Arguments for which you supply values are in *italic screen* font.
^	The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Notes use the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Cautions use the following conventions:

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

- *Cisco 4x InfiniBand HCA Expansion Card for IBM BladeCenter User Guide*
- *Cisco Boot over IB User Guide for Linux*
- *Cisco Boot over IB User Guide for Windows*

- *Cisco Command Line Interface Reference Guide*
- *Cisco Chassis Manager User Guide (Web GUI)*
- *Cisco Element Manager User Guide*

Contacting Technical Support

Please read this section before contacting IBM or Cisco technical support.

IBM Support Contact Information

For technical support, see the following Web site:

http://www.ibm.com/support

To contact technical support, send E-mail to support@ibm.com or see one of the telephone numbers below.

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers in Table 1.

Table 1 EU Country Telephone List

Austria—43-1-24592-5901	Italy—9-02-482-9202
Belgium—02-718-4339	Luxembourg—352-360385-1
Denmark—4520-8200	Netherlands—020-514-5770
Finland—358-9-4591	Portugal—351-21-7915-147
France—0238-557-450	Spain—34-91-662-4916
Germany—07032-15-4920	Sweden—46-8-477-4420
Greece—30-210-688-1220	United Kingdom—01475-555-055
Ireland—353-1-815-4000	

Phone numbers are subject to change without notice.

Note IBM and Cisco are both available for more information. For support, contact IBM before Cisco.

Before You Call

Be prepared to provide the following information to support personnel.

General Information

- Technical Support registration number, if applicable
- Error messages received
- Detailed description of the problem and specific questions
- Description of any troubleshooting steps already performed and results

Server configuration

- Type of server, chip set, CPU, amount of RAM, # of nodes
- Attached storage devices (output from cat /proc/scsi/scsi)
- InfiniBand configuration (output from /usr/local/topspin/sbin/hca_self_test)

Topspin Chassis configuration

- Chassis model
- Output from the show running-status all command

Topspin Chassis Serial Number

The chassis serial number and corresponding bar code are provided on the serial number label. This can be found on the bottom of the chassis or the outside of the Topspin chassis box packaging. It can also be found in the output of the show backplane command.

Determining the Software Version

If InfiniBand drivers are already installed on the host, to determine the version of the Topspin Linux host drivers you are running, enter the following command at the prompt.

```
$ rpm -qa | grep topspin
topspin-ib-mod-rhel3-2.4.21-32.ELsmp-3.2.0-82
topspin-ib-mpi-rhel3-3.2.0-82
topspin-ib-rhel3-3.2.0-82
```

Downloading the Latest Software Release

To verify that you are running the latest available release, compare your version against the latest version on the Cisco support website at http://www.cisco.com/cgi-bin/tablebuild.pl/sfs-linux. After registering your product, you should have received a username and password to give you access to this site.

Cisco Systems Support Contact Information

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

IBM Statement of Limited Warranty Z125-4753-08 04/2004

Part 1 - General Terms

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term “Machine” means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term “Machine” does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.**

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications (“Specifications”) which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What This Warranty Does Not Cover

This warranty does not cover the following:

- any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
- failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
- failure caused by a product for which IBM is not responsible; and
- any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance with "how-to" questions and those regarding Machine set-up and installation, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

When you contact IBM for service, you must follow the problem determination and resolution procedures that IBM specifies. An initial diagnosis of your problem can be made either by a technician over the telephone or electronically by access to an IBM website.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive), IBM will ship the CRU to you for you to install.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone or electronically, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Your Additional Responsibilities

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to:

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
   a. follow the service request procedures that IBM or your reseller provides;
   b. backup or secure all programs, data, and funds contained in the Machine;
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
   d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

IBM is responsible for loss of, or damage to, your Machine only while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and

2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term “Machine” includes Machine Code and Licensed Internal Code (“LIC”).

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BOLIVIA

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of La Paz.

BRAZIL

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

CHILE

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Civil Courts of Justice of Santiago.

COLOMBIA

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of the Republic of Colombia.

EQUADOR

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of Quito.

MEXICO

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Federal Courts of Mexico City, Federal District.

PARAGUAY

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of Asuncion.

PERU

Limitation of Liability: The following is added at the end of this section:

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct (“dolo”) or gross negligence (“culpa inexcusable”).

URUGUAY

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the City of Montevideo Court's Jurisdiction.

VENEZUELA

Jurisdiction: *The following is added after the first sentence*:

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Courts of the Metropolitan Area Of the City of Caracas.

NORTH AMERICA

How to Obtain Warranty Service: *The following is added to this Section*:

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Limitation of Liability: *The following replaces item 1 of this section*:

1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence*:

laws in the Province of Ontario.

UNITED STATES

Governing Law: The following replaces "laws of the country in which you acquired the Machine" in the first sentence:

laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section*:

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this section*:

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: The following replaces "laws of the country in which you acquired the Machine" in the first sentence:

laws of the State or Territory.

CAMBODIA AND LAOS

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence*:

laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, AND LAOS

Arbitration: *The following is added under this heading*:

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence*:

laws of Hong Kong Special Administrative Region of China.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section*:

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; and
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading*:

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

Governing Law: *The following sentence is added to this section*:

Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MALAYSIA

Limitation of Liability: *The word "SPECIAL" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section*:

The warranties specified in this section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this section*:

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence*:

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following*:

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: *The following is added under this heading*:

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: *The words* "SPECIAL" *and* "ECONOMIC" *in item 3 in the fifth paragraph are deleted*.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

How to Obtain Warranty Service:

Add the following paragraph in **Western Europe** (Andorra, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Vatican State, and any country subsequently added to the European Union, as from the date of accession):

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

If you purchase a Machine in one of the Western European countries, as defined above, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service.

If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase a Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

Governing Law:

The phrase "the laws of the country in which you acquired the Machine" is replaced by:

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia**; 2) "the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna**; 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania**; 4) "the laws of England" **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe**; and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland**.

Jurisdiction: *The following is added after the first sentence*:

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the

execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading*:

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

The warranty for Machines acquired in EU countries is valid and applicable in all EU countries provided the Machines have been announced and made available in such countries.

How to Obtain Warranty Service: *The following is added to this section*:

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:

IBM Warranty & Service Quality Dept.

PO Box 30

Spango Valley

Greenock

Scotland PA16 0AH

CONSUMERS

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, NORWAY, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND

Limitation of Liability: *The following replaces the terms of this section in its entirety*:

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term “Machine” includes Machine Code and Licensed Internal Code (“LIC”).

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety*:

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term “Machine” includes Machine Code and Licensed Internal Code (“LIC”).

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

The provisions of this Statement of Limited Warranty replace any applicable statutory warranties.

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section*:

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section*:

During the warranty period, IBM will reimburse you for the transportation charges for the delivery of the failing Machine to IBM.

Limitation of Liability: *The following paragraph is added to this section*:

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this section*:

as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term “Machine” includes Machine Code and Licensed Internal Code (“LIC”).

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this section*:

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section*:

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section*:

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section*:

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

HUNGARY

Limitation of Liability: *The following is added at the end of this section*:

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *The following is added to this section*:

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces the terms of this section in its entirety*:

For the purposes of this section, a “Default” means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the Items for Which IBM is Not Liable below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph*:

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this section*:

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces the terms of this section in its entirety*:

For the purposes of this section, a “Default” means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for:
   a. death or personal injury caused by the negligence of IBM; and
   b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the Items for Which IBM is Not Liable below, for physical damage to your tangible property resulting from the negligence of IBM.

3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below.

Note "Region" means either Hong Kong or Macau Special Administrative Region of China.

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:

1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Table 1 Machine type Cisco InfiniBand Switch Module for IBM BladeCenter

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	1 year	1

* See "Types of Warranty Service" for the legend and explanations of warranty-service types.

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

1. **Customer Replaceable Unit ("CRU") Service**

   IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your Machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your Machine. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

2. **On-site Service**

   IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. For some Machines, certain repairs may require sending the Machine to an IBM service center.

3. **Courier or Depot Service***

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

5. **CRU and On-site Service**

   This type of Warranty Service is a combination of Type 1 and Type 2 (see above).

6. **CRU and Courier or Depot Service**

   This type of Warranty Service is a combination of Type 1 and Type 3 (see above).

7. **CRU and Customer Carry-In or Mail-In Service**

   This type of Warranty Service is a combination of Type 1 and Type 4 (see above).

When a 5, 6 or 7 type of warranty service is listed, IBM will determine which type of warranty service is appropriate for the repair.

* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM's Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages**.

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

EU Country Telephone List

Phone numbers are subject to change without notice. For the warranty service contact telephone number in a country subsequently added to the EU and not yet reflected in the list below, contact IBM in that country or visit the website above for a current telephone listing.

Austria—+43-1-24592-5901	Latvia —+386-61-1796-699
Belgium —+32-70-23-3392	Lithuania —+386-61-1796-699
Cyprus —+357-22-841100	Luxembourg —+352-298-977-5063
Czech Republic —+420-2-7213-1316	Malta —+356-23-4175
Denmark —+45-4520-8200	Netherlands —+31-20-514-5770
Estonia —+386-61-1796-699	Poland —+48-22-878-6999
Finland —+358-8001-4260	Portugal —+351-21-892-7147
France —+33-238-557-450	Slovakia —+421-2-4954-1217
Germany —+49-1805-253553	Slovenia —+386-1-4796-699
Greece —+30-210-680-1700	Spain —+34-91-714-7983
Hungary —+36-1-382-5720	Sweden —+46-8-477-4420
Ireland —+353-1-815-4000	United Kingdom —+44-1475-555-055
Italy —+39-800-820-094	

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e-business logo	Tivoli Enterprise
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Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

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Note This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

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This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

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声　　明
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该产品可能会造成无线电干扰。
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干扰采取切实可行的措施。

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

DANGER

Some laser products contain an embedded
Class 3A or
Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam,
do not view directly with optical instruments, and avoid direct
exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 21:

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

About the Server Switch Module

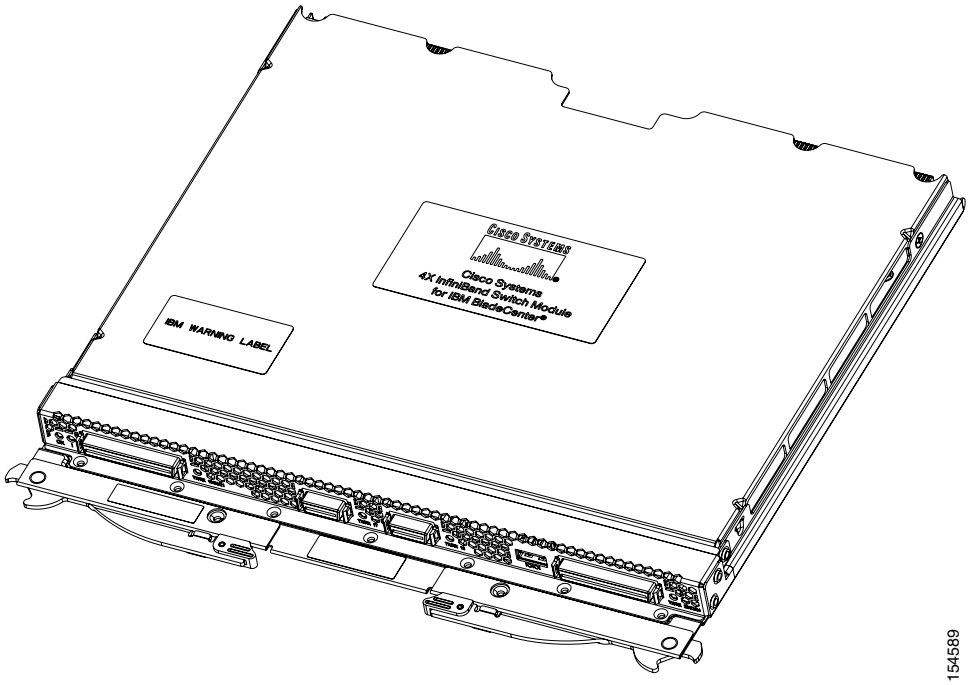
This chapter describes the Cisco 4x InfiniBand Switch module for IBM BladeCenter. This chapter contains the following sections:

- Introduction, page 1-1
- Topologies, page 1-3
- Module Management, page 1-3
- LEDs, page 1-4
- External InfiniBand Ports, page 1-5

Introduction

The Cisco 4x InfiniBand Switch module for IBM BladeCenter (hereafter "Server Switch Module") adds InfiniBand (IB) switching capability to hosts in your IBM BladeCenter H chassis. When you add one or two Server Switch Modules to your BladeCenter chassis and add HCA expansion cards to your BladeCenter hosts, your hosts can communicate to one another over IB within the chassis. When you connect the Server Switch Module to an outside IB fabric, BladeCenter hosts can communicate with all nodes that connect to the IB network. Figure 1-1 shows the Server Switch Module.

Figure 1-1 Cisco 4x InfiniBand Switch Module for IBM BladeCenter



Each Server Switch Module includes 16 4x ports to the backplane and 8 4x ports (in the form of 2 4x connectors and 2 12x connectors) on the front panel. The Server Switch Module provides full non-blocking switching for all 24 ports. On the backplane, 14 of the internal 4x ports provide 10 Gbps connections to the HCA expansion cards on server blades. The two remaining internal 4x ports provide connections to the chassis expansion modules. All external 4x connectors provide 10 Gbps connections to the outside IB network and can autonegotiate connection speed.

Server Switch Modules transmit information to and from BladeCenter Management Modules over Ethernet (through an internal Ethernet switch) to facilitate setup and management. After you set up a Server Switch Module and bring it online, the on-board Cisco Subnet Manager brings distributed intelligence to the IB network.

Cisco Server Switch Modules allow you to perform a field upgrade to load the latest firmware on the Server Switch Module. You can perform a firmware upgrade even following a failed upgrade. CLI and GUI interfaces both support upgrades. For details, see the *Command Line Interface Reference Guide* or the *Element Manager User Guide*.

Server Switch Module and HCA Expansion Cards

Within the BladeCenter unit, Server Switch Modules manage traffic to and from HCA expansion cards on the BladeCenter hosts. Each HCA expansion card adds two IB ports to a BladeCenter host. Each HCA port connects through the unit backplane to a particular Server Switch Module slot. The first IB port of each HCA card (ib0) connects to the Server Switch Module in I/O slot 7, and the second IB port of each HCA card (ib1) connects to I/O slot 9. For detailed information about the HCA expansion card, see the *Cisco 4x InfiniBand HCA Expansion Card for IBM BladeCenter User Guide*.

Topologies

With the Server Switch Module and HCA expansion cards, you can create a non-redundant, single-switch topology or a redundant, dual-switch topology.

Note There are four I/O module bays in the switch, labelled 7-10. Bay 7 is for the first InfiniBand interface, and bay 9 is for the second InfiniBand interface. Bays 8 and 10 are not supported.

Single-Switch Topology

When you populate just one BladeCenter module slot with a Server Switch Module, you create a simple topology which provides full bandwidth between ports. However, this topology does *not* provide redundant links from the HCA expansion cards to the Server Switch Module. We strongly recommend that you implement a "Dual-Switch Topology" to avoid single points of failure.

Dual-Switch Topology

To enable IB redundancy on the BladeCenter chassis, you must install one Server Switch Module in each available slot. HCA expansion cards do not support redundant links to a single Server Switch Module slot. When you add a second Server Switch Module to the BladeCenter chassis, each port of each HCA expansion card connects to a Server Switch Module.

Note The Server Switch Modules do not connect to each other within the BladeCenter chassis. To connect the modules to enable features such as subnet manager failover, connect the modules with an IB cable through the external connectors. Before you connect the two Server Switch Modules in your chassis, configure the priority of the subnet managers on the modules. For step by step instructions, see the "Connecting Beyond BladeCenter" section on page 2-5.

Module Management

You can manage your Server Switch Module with any of the following interfaces:

- Simple Network Management Protocol (SNMP) versions 1, 2, and 3 with Cisco's Management Information Base (MIBs)
- TopspinOS command line interface (CLI)
- Chassis Manager Web-based GUI
- Element Manager Java-based GUI
- APIs (through SNMP)

For instructions that show how to configure your Server Switch Module with the CLI, see the *Command Line Interface Reference Guide*. For instructions that show how to configure your Server Switch Module with Chassis Manager, see the *Chassis Manager User Guide*. For instructions that show how to configure your Server Switch Module with Element Manager, see the *Element Manager User Guide*.

LEDs

The Server Switch Module provides module status LEDs and port status LEDs. Table 1-1provides more information about the LEDs.

Note External port numbers begin at 17 because ports 1 through 16 are internal.

Table 1-1 Server Switch Module LED Status

LED Label	Color	Function		
Status	Yellow	**!—Yellow**	**OK—Green**	**Decode**
- !	Green	Off	Off	Module powered off or LED failure
- OK		Blink	Blink	LED test, first 1-3 seconds after power on
		Off	Blink	Test in progress
		On	Off	Critical module error detected; operator intervention required
		On	On	Non-critical module operating with no errors detected
		Off	On	Module operating with no detected errors

Server Switch Module Status LEDs

Module Status LEDs provide an at-a-glance indication of the health of the Server Switch Module. The tables list and describe the states of the Module Status LEDs.

Port Status LEDs

The port LEDs on the Server Switch Module indicate connection and transmission status (see tables below). Link LEDs indicate connection status. Traffic LEDs indicate transmission status.

Table 1-2 IB 4x Port LED Status Indicators

LED Label	Color	Function	
<port #>	Green	**LED Indication**	**Decode**
TX/RX		Off	4x port has not established logical link.
		On	4x port is logically connected.
		Blinking	4x port is transmitting or receiving packets

Table 1-3 IB 12x Port LED Status Indicators

LED Label	Color	Function	
<port #>	Green	**LED Indication**	**Decode**
TX/RX		Off	12x port has not established logical link.
		On	12x port has established logical link.
		Blinking	12x port is transmitting or receiving packets.

External InfiniBand Ports

The Server Switch Module has both 4x IB and 12x IB external connectors. The 12x IB connectors support three 4x connections using an "octopus cable." This cable begins as one 12x connector (which connects to your Server Switch Module), then branches into three 4x connectors that you can attach to 4x IB interfaces. The external ports are numbered 17 - 24. Ports 19 / 20 /21 and ports 22 / 23 / 24 are on 12x connectors and can be set up as 12x or three 4x connections.

Installing and Configuring the Server Switch

This chapter describes installing and configuring the Server Switch Module and configuring the password and system clock, Additional configuring includes synchronizing with NTP and extending an InfiniBand fabric

This chapter contains the following sections:

- Installing the Server Switch Module, page 2-1
- Downloading Operating System Software from Cisco.com, page 2-1
- Configuring the Server Switch Module, page 2-2
- Connecting Beyond BladeCenter, page 2-5

Installing the Server Switch Module

To install the Cisco Server Switch Module, follow these steps:

Step 1 Ensure that you are properly grounded by attaching the ESD wrist strap to bare skin and attaching the clip on the other end to unpainted metal.

Step 2 Choose the I/O slot into which you want to install the Server Switch Module. You must install the module in I/O slot 7 or slot 9.

Step 3 Refer to your BladeCenter unit documentation for standard hardware module installation instructions.

Downloading Operating System Software from Cisco.com

The operating system associated with the Cisco 4x InfiniBand HCA Expansion Card for IBM BladeCenter can be downloaded from www.cisco.com by using the Technical Support & Documentation link. To download the software, follow these steps:

Step 1 Go to www.cisco.com and log in with your CCO user ID.

Step 2 Click **Technical Support & Documentation**.

Step 3 Click **Software Downloads**.

Step 4 Click **Server Networking & Virtualization Software**.

Step 5 Click **Cisco InfiniBand Switch Module for IBM BladeCenter** to obtain the operating system TopspinOS v2.6.0.

The software is an ISO image.

Step 6 Burn the ISO image onto a CD.

The ISO image contains the latest switch operating system software, release notes and other documentation.

Configuring the Server Switch Module

To configure the Cisco InfiniBand Server Switch Module, follow these steps:

Step 1 Open the BladeCenter Chassis Manager log-in screen by launching a Web browser and entering the IP address of the BladeCenter chassis in the address bar.

Step 2 Log in.

The BladeCenter Chassis Manager interface appears.

Step 3 Expand I/O Module Tasks in the left-hand navigation tree.

Step 4 Select **Management** under **I/O Module Tasks** in the left pane.

An I/O Module Management heading appears in the display.

Step 5 Click the link of the physical slot that holds the Server Switch Module that you want to configure.

A heading appears, where *X* is the number of the slot.

Step 6 Enter an IP address for the Server Switch Module in the IP address field of the New Static IP Configuration section.

Note The IP address of the Server Switch Module *must* fall in the same subnet as the modules in the other slots.

Step 7 Enter a subnet mask or the Server Switch Module in the Subnet mask field of the New Static IP Configuration section.

Note The subnet mask of the Server Switch Module *must* match the subnet mask of the modules in the other slots.

Step 8 Enter a gateway IP address for the Server Switch Module in the Gateway address field of the New Static IP Configuration section, and then click **Save**.

Note The gateway address of the Server Switch Module *must* match the gateway address of the modules in the other slots.

Step 9 Open a Telnet session to the Server Switch Module with the IP address that you configured in Step 6. Log in to your Server Switch Module, and then proceed to "Changing the Default Password" to secure your Server Switch Module. Log in with the default user name of **USERID** and password of **PASSW0RD**, where the 0 in PASSW0RD is a zero.

```
Switch(Cisco BladeCenter)
Cisco BladeCenter login: USERID
Password: xxxxxxxx

Cisco BladeCenter>
```

Changing the Default Password

Change the default password immediately to secure your Server Switch. To change the default administrative password, follow these steps:

Step 1 Switch to Privileged Exec mode by entering the **enable** command.

```
Cisco BladeCenterH> enable
Cisco BladeCenterH#Switch to Global Configuration mode by entering the configure terminal
command.
Cisco BladeCenterH# configure terminal
Cisco BladeCenterH(config)#
```

Step 2 Change the password of the user ID by entering the **username** command. Include the following:

- User ID for which you need to change the password (in this case, **USERID**)
- **password** keyword
- New password that you want to apply to the user ID

```
Cisco BladeCenterH(config)# username USERID password n0accE$$
```

Step 3 Return to User Exec mode by entering the **exit** command with the **all** keyword.

```
Cisco BladeCenterH(config)# exit all
Cisco BladeCenterH>
```

Configuring the System Clock

Configure your system clock immediately so that all system messages include accurate timestamps. You can either configure the clock setting on the onboard Server Switch clock, or you can synchronize your Server Switch to a network time protocol (NTP) server.

To configure the clock settings on the onboard clock, follow these steps:

Step 1 Switch to Privileged Exec mode by entering the **enable** command.

```
Cisco BladeCenterH> enable
Cisco BladeCenterH#
```

Step 2 Set the on-board clock by entering the **clock set** command with the following variables:

- the time of day in *hh:mm:ss* format
- the day in *dd* format
- the month in *mm* format
- the year in *yy* format

The example that follows sets the date to 1:45 am on June 3rd, 2004:

```
Cisco BladeCenterH# clock set 01:45:00 03 06 04
```

To configure primary, secondary, and tertiary NTP servers to synchronize the Server Switch with the network, follow these steps:

Step 1 Switch to Privileged Exec mode by entering the **enable** command.

```
Cisco BladeCenterH> enable
Cisco BladeCenterH#
```

Step 2 Switch to Global Configuration mode by entering the **configure terminal** command.

```
Cisco BladeCenterH# configure terminal
Cisco BladeCenterH(config)#
```

Step 3 Assign a primary NTP server by entering the **ntp** command with this information:

- **server-one** keyword
- IP address of the NTP server

```
Cisco BladeCenterH(config)# ntp server-one 10.2.0.13
```

Step 4 (Optional, Recommended) Assign a secondary NTP server by entering the **ntp** command with this information:

- **server-two** keyword
- IP address of the NTP server

```
Cisco BladeCenterH(config)# ntp server-two 10.2.0.14
```

Step 5 (Optional, Recommended) Assign a tertiary NTP server by entering the **ntp** command with this information:

- **server-three** keyword
- IP address of the NTP server

```
Cisco BladeCenterH(config)# ntp server-three 10.2.0.15
```

Connecting Beyond BladeCenter

To extend your InfiniBand fabric beyond your BladeCenter cluster, you must configure the priority of the subnet manager on your Server Switch Module, then connect one or more of the external interfaces on your Server Switch Module to an outside InfiniBand fabric.

The device with the highest subnet manager priority becomes the master subnet manager in the InfiniBand network. To configure subnet manager priority, follow these steps:

Step 1 Switch to Privileged Exec mode by entering the **enable** command.

```
Cisco BladeCenterH> enable
Cisco BladeCenterH#
```

Step 2 Switch to Global Configuration mode by entering the **configure** command.

```
Cisco BladeCenterH# configure
Cisco BladeCenterH(config)#
```

Step 3 Configure the priority of the subnet manager by entering the **ib sm** command with this information:

- **subnet-prefix** keyword
- Subnet prefix of the InfiniBand network to which the Server Switch belongs
- **priority** keyword
- Priority integer value of the subnet manager (1 is the lowest the priority)

```
Cisco BladeCenterH(config)# ib sm subnet-prefix fe:80:00:00:00:00:00:00 priority 1
```

Step 4 Exit Global Configuration mode.

```
Cisco BladeCenterH(config)#exit
Cisco BladeCenterH#
```

Step 5 Save the configuration by entering the copy running-config startup-config command.

```
Cisco BladeCenterH# copy running-config startup-config
Cisco BladeCenterH#
```

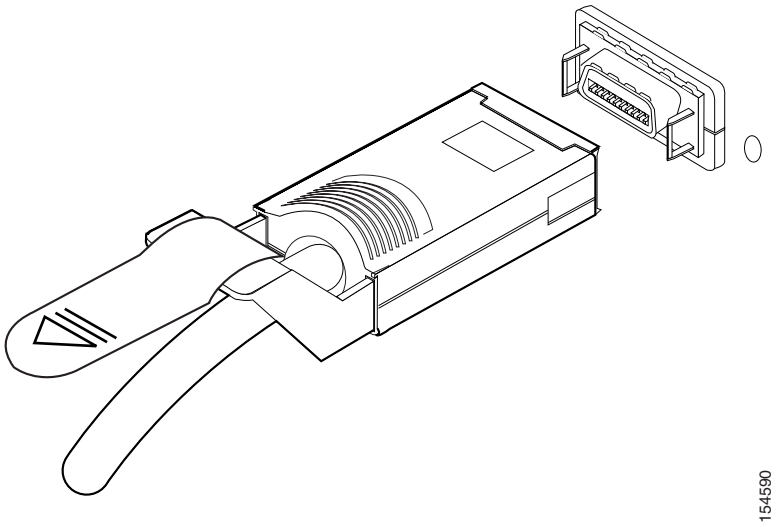
After you configure your subnet manager priority, connect your Server Switch Module to the outside InfiniBand fabric. By default, the external interfaces on your Server Switch Module auto-negotiate speed with the fabric.

Connecting InfiniBand Cables

To plug in an InfiniBand cable, push the connector into the interface until you hear/feel a click.

To remove a cable with a pull connector, grasp the connector with one hand and push it *toward* the port, then pull the latch away from the port with your other hand and gently wiggle the connector away from the port.

Figure 2-1 Removing a Pull Connector



Specifications

This chapter details the Server Switch Module specifications.

Electrical Requirements

Table 3-1 DC Supply Requirements

Area	Requirement
DC Supply Voltage	12.2 Volts nominal
DC Supply Current	6.0 Amps maximum
DC Supply Power without External Port Powered Devices	39 watts maximum
DC Supply Power with External Port Powered Devices	60 watts maximum

Note External port powered devices are limited to 21 watts total.

Environmental Requirements

Table 3-2 Environmental Requirements

Area	Requirement
Module Operating Temperature	0 to +60 degrees C (module inlet)
Forced Air Cooling: Rate	6.5 CFM minimum
Module Non-Operating Temperature	-40 to +70 degrees C
Operating Altitude	0 to 2133 meters
Non-Operating Altitude	0 to 11,000 meters
Operating Humidity	5% to 85% non-condensing
Non-Operating Humidity	5% to 95% non-condensing
Operational Shock	3.5G for 3 mSec.

Area	Requirement
Operational Vibration	0.27G at 5Hz to 500Hz for 30 minutes
Storage Shock	50G with a velocity change of 3454 mm/sec squared
Storage Vibration	0.5G at 2Hz to 200Hz for 15 minutes

Note In the case of non-uniform air flow, the velocity at any point must meet or exceed 150 LFM.

A

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C

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